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Theoretical study of the K, Rb, and Fr lifetimes EUGENIYA ISKRENOVA TCHOUKOVA, MARIANNA SAFRONOVA, University of Delaware — We calculate ns, np, and nd lifetimes in K, Rb, and Fr using relativistic high-precision all-order method where all single and double excitations of the Dirac-Hartree-Fock wave function are included to all orders of perturbation theory. Additional calculations are carried out where necessary to account in part for effects of valence triple excitations and to evaluate the uncertainty of the calculations. The data are compared with available experimental values. Our calculations provide benchmark data for a number of E1 matrix elements and branching ratios. We identify lifetimes that are particular useful for tests of high-precision theory owing to extremely large correlations to certain electric-dipole matrix elements. Fr calculations are motivated also by the study of parity nonconservation with this atom [1].
[1] G. Gwinner, E. Gomez, L. A. Orozco, A. Perez Galvan, D. Sheng, Y. Zhao, G. D. Sprouse, J. A. Behr, K. P. Jackson, M. R. Pearson, S. Aubin, and V. V. Flambaum, Hyp. Int. 172 , 45 (2006).

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